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REVISION RECORD

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Z10 - APPENDIX A SUSTAINABLE DESIGN REQUIREMENTS (FACILITY ONLY)

1.0 INTRODUCTION AND REQUIREMENTS

- A. *Designing, constructing, and operating facilities in an efficient and environmentally sound manner is important to LANL. Such high-performance facilities are intended to minimize impacts to the site and surrounding areas, optimize energy and water use, provide good indoor environmental quality, incorporate environmentally preferable building products, and manage construction and building operation waste in a resource-conserving manner. This approach to building design, construction, and operation is commonly referred to as sustainable (or green building) design and development (SD). The primary objectives of SD are to:*
- *minimize, during design, the anticipated waste generation and resource consumption of a facility in all of its life cycle phases: construction, operation and closure,*
 - *provide, during design and construction, for the comfort and well-being of building occupants,*
 - *limit, during design and construction, facility impacts on the surrounding environment and environmental processes (such as the water cycle).*
- B. *It is LANL's goal to apply sustainable design and development principals to all new buildings and major renovation projects to provide a healthful, resource-efficient and productive working environment. To achieve this goal requires an awareness of and a commitment to sustainable design through an integrated, whole-building design approach.*
- C. *The [LANL Sustainable Design Guide](#) was created to provide guidance on incorporating the latest sustainable building strategies and technologies on LANL-specific projects. It is a thorough, complete, and comprehensive resource for implementation of sustainable design principles and practices specific to LANL project. This resource should be applied to all new facilities and major renovation projects.*
- D. *In addition, the U. S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating System, version 2.1, (www.usgbc.org) and the Whole Building Design Guide (www.wbdg.org) are tools that can help ensure that sustainable elements are incorporated into the facility design. Specific to laboratory facilities, refer to Lawrence Berkeley Lab's [Design Guide for Energy-Efficient Research Laboratories](#) for additional SD guidance.*
- E. *LEED Green Building Rating System™: New facility and major renovation projects at LANL may be scored using the LEED rating system, in anticipation of submitting the building for certification as a green building. LANL intends for all new buildings and major renovation projects over 15,000 square feet to be capable of certification as a "green" building through the LEED rating system. LANL's requirement for an EE/SD Report during the design process significantly aid in this application process. Actual LEED certification requirements and responsibilities will be specified in contract documents.*

F. *Specific items for consideration as part of this sustainable design effort are referenced by specific discipline in other sections of the ESM. Additionally, key concepts and components of sustainable design, and suggested elements for consideration, are described below. The A/E is encouraged to suggest other measures and develop integrated solutions to meet the intent of sustainable design, and conduct a benefit/cost analysis of selected options. The A/E should coordinate with the ESM Discipline POCs with regards to green building materials, pollution prevention issues, and associated benefit/cost analysis. In all cases, it is essential to evaluate these items from a whole building (integrated) design approach (whole building design looks at how materials, systems and products of a building connect and overlap, and how the building and its systems can be integrated with supporting systems on its site and in its community). To demonstrate a commitment to LANL SD goals and objectives, the following strategies, as confirmed by the responsible LANL Project Manager, will be pursued for all new building and major renovation projects at LANL:*

- *Adopt energy and environmental performance goals to minimize energy consumption and reduce environmental impacts.*
- *Assess opportunities from a whole-building approach to maximize energy and water conservation through comprehensive, integrated evaluations of all components, systems, and, as appropriate, processes.*
- *Use life cycle cost decision-making balanced with first cost constraints. Life-Cycle Cost Analysis (LCCA) shall be in accordance with the NIST Handbook 135 (current edition), Life-Cycle Costing Manual for the Federal Energy Management Program, and NISTIR 85-3273-xx, Energy Price Indices and Discount Factors for Life Cycle Cost Analysis 19xx. BLCC V4.x is the recommended software to use for LCCA.*
- *Commission equipment and controls in all new construction and major renovation projects as an integrated effort during design and construction to verify building system performance and functionality for the Users and for Facilities operations and maintenance.*
- *Employ a broad range of advanced energy and water efficiency strategies, including but not limited to central plant optimization, airside supply and exhaust distribution optimization, energy recovery methods, lighting design optimization, and water use reduction measures.*
- *Measure energy and water consumption using direct digital control (DDC) monitoring systems or by other means if DDC not available.*
- *Specify environmentally preferable construction materials and construction waste reduction methods.*

G. Sustainable Design Report. Submit to LANL an Energy Efficiency/Sustainable Design (EE/SD) Report per Att. 3 of DOE Order 430.2A, Departmental Energy and Utilities Management, <http://www.directives.doe.gov/pdfs/doe/doetext/neword/430/o4302a.pdf> for each new building, building addition, or retrofit where either:

- The total energy consumption is expected to exceed 500 million Btu per year, or
- The floor area being built or retrofit is larger than 10,000 gross square feet

Attachments 1 and 2 contain detailed requirements for EE/SD reports for GPP projects. Attachment 3 contains detailed requirements for EE/SD reports for certain Line Item projects. Any additional or project-specific EE/SD Reporting requirements will be identified in contract documents. NOTE: [LANL PM Division Procedure 411](#) Rev 1, when issued, is expected to have preferred EE/SD report requirements and format, and it can be used in lieu of Attachments 1-3 with ESM Chapter 1 POC approval.

Guidance: The reports demonstrate that the designer has applied Federal sustainable design principles to their design and include certification that the design complies with Federal performance standards for energy efficiency (10 CFR 434). The LEED Green Building Rating System™ format (<http://www.usgbc.org/>) can be used when addressing the SD elements.

- H. Show compliance with ASHRAE Standard 90.1 by an accepted industry computerized analysis tool. *Guidance: Consider use of “Energy-10” Software for design and construction evaluation. <http://www.nrel.gov/buildings/energy10/> or COMcheck-EZ http://www.energycodes.gov/comcheck/ez_download.stm*
- I. Line Item Projects: In addition to the SD goals and objectives described above, comply with these SD requirements specific to non-process line item projects (e.g., offices, labs):
1. Incorporate, at a minimum, fundamental building systems commissioning that meets the LEED commissioning prerequisite criterion requirements.
 2. Specifically address LEED criterion in an EE/SD report.
 3. Conduct an 8-hour-minimum SD charrette (brainstorming/decision-making) at project outset (described below).

Design Charrette. A design charrette, focused on sustainable design and development, shall be conducted at the beginning of the sustainable design process. A charrette is a focused and collaborative brainstorming session held at the beginning of the project. The charrette encourages an exchange of ideas and information and allows truly integrated solutions to take form. Team members are encouraged to "cross fertilize" and address problems beyond their field of expertise. Participants shall include a facilitator, the A/E design team, user representatives, and the Project Team. The product of the charrette will be a “roadmap” for incorporating sustainable design and development into the project.

Finalists for A/E services are expected to propose potential sustainable design and energy conservation measures for the project during the A/E interviews. These and other measures will be evaluated and further developed during the charrette.

Sustainable Design Charrette Deliverables:

- A list of sustainable energy design measures that will be incorporated in the design.
- Establishment of sustainable design targets and goals.
- A list of sustainable design measures for which the A/E will determine their life-cycle costs. These measures will be incorporated in the design if cost effective and within project budget constraints.
- Establishment of Performance Metrics.
- A summary report that provides direction for the design team.
- Requirements to conduct and document the design charrette shall be identified in contract documents.

2.0 ADDITIONAL GUIDANCE

Apply the following guidance on SD principles and practices to the design of all new facilities and major renovation projects:

A. SUSTAINABLE SITES

1. General: The location of a building affects a wide range of environmental factors such as the energy consumed by occupants for commuting, the impact on local ecosystems, and the extent to which existing structures and infrastructures are utilized. Site planning should consist of a whole system approach that seeks to reduce environmental impacts, and protect habitat and open space. A separate site analysis will be conducted as part of Line Item projects. Optimize potential of selected site through site planning, which evaluates solar and wind orientation, local microclimate, drainage patterns, utilities and existing site features to develop optimal building site design and low maintenance landscaping.
2. Specific: Protect and/or develop sustainable site conditions by:
 - Providing erosion and sedimentation control during construction
 - Minimizing the extent of site clearing, excavations, and material and equipment storage activities on previously undisturbed land.
 - Designing onsite collection, conveyance, and storage capacity for storm water that enables infiltration into the subsurface,
 - Reducing heat islands through use of highly reflective materials for impermeable surfaces (such as roof, walkways, parking lots, etc.)
 - Minimizing light pollution from exterior lighting fixtures, preventing light trespass beyond the project boundary, and specifying shielded or full cutoff-type fixtures.

B. WATER EFFICIENCY

1. General: Reducing water consumption and improving water quality are key objectives of Sustainable Design. To the maximum extent feasible, projects should increase their dependence on water that is collected, used, purified, and reused on site. The protection and conservation of water will be considered throughout the life of the building, and be incorporated within the whole building-integrated design approach.
2. Specific: Protect and conserve water through design considerations, including:
 - Use of roof runoff and/or gray water to irrigate landscaping
 - Use of only native, drought tolerant plants for landscaping
 - Use of recycled content water for cooling tower feed
 - A minimum of 5 cycles of concentration for cooling tower operation
 - Exceeding the requirements of the Energy Policy Act of 1992 for plumbing fixtures

C. ENERGY EFFICIENCY AND CONSERVATION

1. General: To successfully design and construct an energy-efficient building it is necessary to design from the outside in. Therefore, the building envelope is the first item of concern in the design process. Once energy conservation features (i.e. insulation levels, spectrally selective glazing, daylighting, etc.) have been determined, equipment (i.e. HVAC, lighting) can be right-sized to meet the building's energy requirements. Energy analysis software is an extremely useful tool to evaluate alternatives. The preferred energy analysis software is DOE 2.2 for PCs.

2. Specific: Minimize energy consumption through Building orientation and massing, natural ventilation, day lighting and other passive strategies that can lower a facilities energy demand. Exceed Federal energy performance standards for energy efficiency (10CFR435). Consider the following measures:
 - Effectively employ daylighting technologies and associated daylighting controls to reduce artificial (dimmable) lighting when possible.
 - Select energy-efficient products and equipment such as Energy Star products, multi-stage boilers and chillers, etc.
 - A Trombe wall, integrated as part of the building design, to provide passive solar heating of the building.
 - Building-integrated photovoltaics (BIPV) to meet a pre-selected amount of non-critical building power needs. This analysis should be coordinated with the ESM Electrical POC and may be considered a demonstration project.

D. MATERIALS AND RESOURCES

1. General: Building materials affect the environment throughout their life-cycle starting with the extraction of raw materials and manufacturing the final product through transporting, installing, using and finally disposing of the product. In fact, construction debris accounts for over half the volume of America's landfills. Environmentally preferable building materials minimize life cycle environmental impacts and minimize impact on occupant health.
2. Specific: Projects should seek to use environmentally preferable products and processes that do not pollute or unnecessarily contribute to the waste stream and do not deplete limited natural resources, by:
 - Maximizing the recycled content of all new materials, especially from a post-consumer perspective. To the extent feasible, consider materials containing recycled content and salvage/recycle of construction waste during construction. Consult 40 CFR 247, Comprehensive Procurement Guide for Products Containing Recovered Materials. <http://www.epa.gov/cpg/products.htm> *Guidance: Consider use of "P2-EDGE" Software for design and construction evaluation. Free BEES software is useful for product evaluations* <http://www.bfrl.nist.gov/oae/software/bees.html>.
 - Specifying materials harvested on a sustained yield basis such as lumber from certified forests.
 - Encouraging the use of recyclable assemblies and products that can be easily "deconstructed" at the end of their useful lives.
 - Limiting construction debris and encouraging the separation of recyclable waste streams during the construction process. A construction waste management plan is useful in achieving this aim.
 - Eliminating the use of materials that pollute or are toxic during their manufacture, use or reuse.
 - Giving preference to locally produced products and other products with low embodied energy content.
 - Providing a dedicated area for the collection of materials for recycle.

E. INDOOR ENVIRONMENTAL QUALITY

1. General: The ultimate success or failure of a project often rests on the quality of its indoor environment, because healthy, comfortable employees are invariably more satisfied and productive. Projects should be designed and constructed to provide high-quality, interior environments for all users. A construction Indoor Air Quality plan is helpful to ensure that building is healthy for occupancy.
2. Specific: Enhance indoor environmental quality through appropriate ventilation, moisture control, and the avoidance of materials and products with high VOC emissions will enhance occupant health and comfort. The integrated design approach for projects should seek to:
 - Value aesthetic decisions, such as the importance of views and the integration of natural and man-made elements.
 - Provide thermal comfort with a maximum degree of personal control over temperature and humidity.
 - Supply adequate levels of ventilation and outside air to ensure indoor air quality;
 - Avoid the use of materials that emit pollutants, such as volatile organic compounds (VOCs) or other toxins.
 - Assure acoustic privacy and comfort through the use of sound absorbing material and equipment isolation.
 - Control disturbing odors through contaminant isolation and careful selection of cleaning products.
 - Create a high performance luminous environment through the thoughtful integration of natural and artificial light sources.

F. GENERAL

1. Utilize the "LANL Sustainable Design Guide" described above.

ENDNOTES : (bases for entire Appendix)

1. These requirements are less than Sandia National Lab requirements that were used as a major reference. They are also less than the EE/SD efforts of several other DOE sites (ORNL, LBNL, etc) and most other federal agencies as of 12-17-03 (DOE: Minutes of various EFCOG Energy Efficiency Working Group meetings at efcog.org; Federal: EMref-19, LEED User Summary 12.17.03)
2. SD has been shown to increase energy efficiency and occupant productivity. Higher energy efficiency will pay for itself over the facility life cycle. Similarly, higher occupant productivity will pay back based on the fact that salaries represent 92% of a building cost versus 2% for construction. Source:

Sustainable Building Technical Manual, Produced by Public Technology Inc., US Green Building Council; Sponsored by U.S. Department of Energy; U.S. Environmental Protection Agency; Copyright © 1996 by Public Technology, Inc. <http://www.wbdg.org/media/pdf/sbtm.pdf> from bottom of file pg 16:

"Viewed over a 30-year period, initial building costs account for approximately just two percent of the total, while operations and maintenance costs equal six percent, and personnel costs equal 92 percent. [footnote 3] Recent studies have shown that green building measures taken during construction or renovation can result in significant building operational savings, as well as increases in employee productivity. Therefore, building related costs are best revealed and understood when they are analyzed over the life span of a building." Footnote 3 Joseph J. Romm, *Lean and Clean Management* (Kodansha International, 1994), 94.

ATT 1 GPP BUILDING SD REQUIREMENTS DOCUMENT (SAMPLE/GUIDANCE)

1. Design and construct the facility using the latest, green-building technologies and integrated sustainable design (SD) approaches. The completed facility will provide a healthful, resource-efficient and productive working environment, and serve as a model for similar LANL facilities. The Contractor is encouraged to suggest measures and develop integrated solutions to meet the intent of sustainable design, and shall conduct a benefit/cost analysis of selected options.
2. Provide documentation of sustainable features for the facility in an EE/SD Report, organized according to the LEED rating categories. Requirements for the EE/SD report are contained in Section 3 below. This will be helpful if LANL decides to submit the facility for certification as a LEED green building or EPA Energy Star building. Documentation includes the elements listed below. The bolded items are required for all projects. The non-bolded items are encouraged.
 - a. Sustainable Sites
 - (1) Erosion and Sediment Control. Completed Erosion and Sediment Control Plan.
 - (2) Reduced Site Disturbance. Construction measures and methods that reduced the extent of site disturbance and/or restore damaged areas.
 - (3) Stormwater Management. Approaches and implemented measures that mitigate storm water flow due to site development.
 - (4) Alternative Transportation. Adopted measures to promote the use of alternative transportation.
 - (5) Heat Islands. Landscape and exterior design features that reduce the heat island effect.
 - (6) Light Pollution Reduction. Adopted measures to reduce the amount of light leaving the site at night.
 - b. Water Efficiency
 - (1) Water Use Reduction. A description of selected systems and quantification of water use reduction resulting from the incorporation of water conserving features into the design of the Facility.
 - (2) Irrigation Efficiency. Limit or eliminate the use of potable water for landscape irrigation.
 - c. Energy and Atmosphere
 - (1) Energy Conservation Report [10 CFR435 compliance, based on guidance in the Federal Users Manual], and additional details as required by DOE O 430.2. Provide the following minimum information:
 - Brief narrative of alternatives considered and description of selected systems, with results of life-cycle analyses.
 - Results of energy analysis, including projected energy use index [BTU/GSF/yr] of selected design.
 - Performance metrics [such as lighting watts/SF, AFUE, CFM/peak fan kW].
 - Cross Reference with the design basis and design analysis.
 - Summary and Recommendations.
 - (2) Commissioning. Verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended.
 - (3) Ozone Protection.
 - (4) Measurement and Verification. Describe any continuous monitoring equipment installed.
 - d. Materials and Resources
 - (1) Recycled Content. Percentage of building materials (by cost) that contain post-consumer and/or post-industrial recycled content.

- (2) Locally Manufactured. Percentage of building materials (by cost) manufactured regionally within a 500-mile radius.
- (3) Locally Harvested. Percentage of building materials (by cost) harvested and extracted within a 500 mile radius.
- (4) Rapidly Renewable. Percentage of building materials (by cost) that are rapidly renewable
- (5) Resource Reuse. Percentage of building materials (by cost) that are salvaged, refurbished or reused

Present the information above in the form of a table with columns reflecting the as-designed and as-constructed material percentages.

- (6) Construction Waste Management Plan. The Contractor shall complete a construction waste management plan with recommended strategies to divert materials from the landfill during construction, and provide an estimate of the percentage of these diverted materials.
- e. Indoor Environmental Quality – provide the following:
 - (1) Construction Indoor Air Quality (IAQ) Plan, During Construction Prevent IAQ problems from the construction process to help sustain comfort and well-being of construction workers.
 - (2) Construction IAQ Management Plan, Before Occupancy. Prevent IAQ problems from the construction process to help sustain comfort and well-being of the building occupants.
 - (3) Low Emitting Materials. Reduce the quantity of indoor air contaminants that are harmful to the well-being of the occupants.
 - (4) Other Design Features. Describe other design features that promote a better indoor environmental quality.
- 3. Sustainable Design Report. Sustainable design attributes incorporated in to the facility shall be documented in an EE/SD Report. The EE/SD report format is as follows:
 - I. Introduction and Overview. This section will be an executive summary that presents a short overview of the sustainable design elements included in the facility.
 - II. Results. This section presents descriptions of each of the SD elements included in the Facility. The results will be presented in a table format. This format and instructions for completion are contained in the attachment [Attachment 2].
 - III. Appendices. In some cases supporting documentation will be required to document compliance with SD elements. This supporting documentation shall be referenced in the table and included in an Appendix.

The final EE/SD report is due at the completion of construction. Interim reports shall be submitted at 50 or 60%, and at 100% design.

ATTACHMENT 2 EE/SD REPORT: RESULTS SECTION COMPLETION GUIDANCE

This document provides guidance to the Contractor and serves as a template for completion of Section II (Results) and Section III (Appendices) of the EE/SD report discussed in Attachment 1. This guidance and template is included in Table 1 below. The intent of Table 1 is threefold:

1. Provide guidance to the design build contractor on LANL's expectations and requirements for the items that should be included in an EE/SD report.
2. Track progress in incorporating SD into the design of the Facility.
3. Compile the SD features that were incorporated into the final design and construction of the Facility.

The use of Table 1 and information entered will change as the project progresses. As it exists now Table 1 is a guidance document. It is organized by LEEDTM category (column 1) and SD requirement (column 2), as presented in Attachment 1, Section 2. Column 3 is intended to assist in assigning responsibility and tracking progress of each SD element. The information presented in the "Guidance, Features included in Design" (column 4) presents additional guidance to assist the contractor in incorporating SD into the design and to complete the required EE/SD report. This column cross-references SD requirements in other parts of the design criteria and details the information that is required to document compliance with the EE/SD report. This documentation will be included as Section III of the EE/SD Report. As the design proceeds, information in Column 4 should be replaced with text indicating the progress in implementing each of the requirements.

The first two columns of Table 1 will remain the same for all reports; however, columns 3 and 4 will change for each of the three SD submittals, as described below.

EE/SD Report (50-60% Design)

Column 3, "Responsible discipline/ Actions required/ Status" should be complete for each requirement, indicating the status and progress toward implementing the requirement. A responsible discipline and a specific individual responsible for implementation shall be identified. Use the last column (4) to describe the feature(s) to meet the requirement. The guidance text shall be removed and replaced with the feature description. At this stage of the design, it is likely that many of the design features will not be complete. In those cases the anticipated design feature will be described with an explanation of how this will meet the requirement. As documentation is completed it will be entered in the appropriate appendix and referenced in the table.

EE/SD Report (100% Design)

The 100% EE/SD Report should have the same format as the 50-60% EE/SD Report. As in the 50-60% report, Column 3, "Responsible discipline/ Actions required/ Status" should be complete for each requirement, indicating the status and a responsible discipline and individual. At this stage of the design, many of the actions will be complete. The last column should also reflect the progress in the design. Only those items that require documentation during construction should be open. As documentation is completed it will be entered in to the appropriate appendix and referenced in the table.

EE/SD Report (Construction Complete)

For this final EE/SD Report, column 3, "Responsible discipline/ Actions required/ Status" shall be removed. Column 5, "Features included in Design" will contain a complete description of the implemented feature, how the feature meets the requirement, and a reference to supporting documentation in the appendix.

TABLE 1. SUSTAINABLE DESIGN FEATURES INCLUDED IN BUILDING XXX (Template)

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|-------------------|---------------------------------|--|---|---|
| Sustainable Sites | Erosion & Sedimentation Control | Erosion and Sediment Control Plan | | <p>Design a sediment and erosion control plan according to U.S. EPA document EPA 832/R-92-005, "Storm Water Management for Construction Activities," Chapter 3. The plan shall meet the following objectives.</p> <ul style="list-style-type: none"> • Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting the topsoil. • Prevent sedimentation of storm sewer or receiving streams. • Prevent polluting the air with dust and particulate matter. <p>If document is prepared and submitted separately (i.e. Storm Water Pollution Prevention Plan), it should be referenced here. Otherwise, summarize the measures implemented and include the sediment and erosion control plan in the appendix.</p> |
| | Reduced Site Disturbance | Construction measures and methods that reduce the extent of site disturbance and/or restore damaged areas. | | <p>The intent of this category is to conserve existing natural areas and to restore damaged areas to provide habitat and to promote biodiversity. The approach differs depending on whether the site is newly developed, a "greenfield" site, or previously developed, a "brownfield" site.</p> <ul style="list-style-type: none"> • On Greenfield sites, document the limits of site disturbance (including earthwork and clearing of vegetation). The goal is 40 ft beyond the building perimeter, 5 ft. beyond primary roadway curbs, walkways and main utility branches, and 25 ft. beyond constructed areas with permeable surfaces. • On Brownfield sites, describe efforts to restore the site by replacing impervious surfaces with native or adapted vegetation. Goal is 50% restoration. <p>Summarize activities here and provide documentation in the appendix, i.e., construction plan, landscaping plan. If these plans are submitted separately, include them as a reference (cite submittal number and date)</p> |

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|--------------------------|----------------------------|--|---|---|
| Sustainable Sites | Storm water Management | Approaches and implemented measures that mitigate storm water flow due to site development. | | At a minimum the Contractor will produce a landscape, integrated with a storm water management system that meets the civil requirements. The goal will be to mitigate storm water flow from undeveloped to developed conditions. Calculations, based on LEED™ guidance, will be provided in the Appendix to demonstrate this mitigation. |
| | Alternative Transportation | Adopted features that promote the use of alternative transportation. | | Alternative transportation features, such as: <ul style="list-style-type: none"> – Location of the building within ¼ mile of two or more bus lines. Include a site map in the Appendix to show compliance. – Bicycle racks and convenient changing/shower facilities for at least 5% of the occupants. Provide a calculation to show compliance. |
| | Heat Islands | Landscape and exterior design features that reduce the heat island effect | | Landscaping and exterior design, which reduces the heat island effect. Include the landscaping plan in the Appendix that demonstrates inclusion of the following features: <ul style="list-style-type: none"> – Shade (within 5 years) on non-roof impervious surfaces (report % coverage) – Use of materials with at least a 0.3 on non-roof impervious surfaces (report % coverage) – Install underground parking (report % of parking) – Use open-grid (net impervious are <50%) pavement system (report % parking) |
| | Light Pollution Reduction | Adopted measures that reduce the amount of light leaving the site at night. | | Efforts to reduce light Pollution, which may include: <ul style="list-style-type: none"> – Full cut-off fixtures for exterior lighting (provide submittals) – Zero direct beam illumination leaving the site (demonstrate with calculations) Include the required simulation, per the LEED™ Reference Guide in the appendix to demonstrate compliance. |
| Water Efficiency | Water Use Reduction | Provide a description of selected systems and quantification of water use reduction resulting from the incorporation of water conserving features. | | Identify specific features and fixtures (i.e. ultra-low flow urinals water closets, faucets and showers; sensors to control water flow; point of use water heating) that reduce water use from that mandated by the 1992 Energy Policy Act (EPACT). Provide a summary spreadsheet as an appendix comparing EPACT requirements with installed equipment. Note compliance with section 1.2.5.F.1 to provide water meter. |

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|--|-----------------------|--|---|---|
| | Irrigation Efficiency | Limit or eliminate the use of potable water for landscape irrigation | | Use high-efficiency irrigation or captured rain or recycled site water as specified in the Civil Requirements to reduce (or eliminate) potable water for irrigation. Describe features, such as high efficiency irrigation and rainwater harvesting to reduce potable water use for irrigation, and estimate the reduced water use. Other civil/architectural requirements (planting and irrigation plans, planting details and specifications) shall either be included in the appendix or referenced (including submittal number and date, if submitted separately) |

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|---------------------|----------------------------|--|---|---|
| Energy & Atmosphere | Energy Conservation Report | <p>Complete an Energy Conservation Report (ECR) for this project based on guidance in the Federal Users Manual, and additional details as required by DOE O 430.2A.</p> <ol style="list-style-type: none"> 1) Brief narrative of alternatives considered and description of selected systems, with results of life-cycle analyses. 2) Results of energy analysis, including projected energy use index (BTU/GSF/yr) of selected design. 3) Performance metrics (such as lighting watts/SF, AFUE, CFM/peak fan kW). 4) Cross Reference with the design basis and design analysis. 5) Summary and Recommendations | | <p>A brief summary of the ECR will be included here. The complete ECR shall be attached in the Appendix. An ECR is mandatory for buildings > 10,000 SF per DOE Order 430.2 (in LANL Contract App G). The ECR will demonstrate minimum compliance with ASHRAE 90.1 and % improvement over ASHRAE 90.1-1999.</p> <ol style="list-style-type: none"> 1) At a minimum address requirements in the architectural requirements for natural day lighting, sustainable design principles, windows, roof construction, thermal resistance/moisture protection, and energy conservation, and in the mechanical requirements for energy efficient mechanical systems, and HVAC. 2) Complete computer simulation as required in the mechanical requirements 3) Minimum cooling requirements are listed (lighting, equipment, air/person) and (user-equipment loads, ventilation air, conditioned air, cleanliness- air handling systems, minimum air quantity). 4) Include a table comparing the design basis with designed systems. |

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|-------------------------|------------------------------|---|---|--|
| Energy & Atmosphere | Commissioning | Verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended. | | Implement the following fundamental best practices <ul style="list-style-type: none"> Engage a commissioning authority Review design intent and basis of design documentation Include commissioning requirements in the construction documents Develop and utilize a commissioning plan Verify installation, functional performance, training and documentation Complete a commissioning report In an appendix, provide a copy (or reference as a separate submittal) of the commissioning plan highlighting the six fundamental commissioning procedures as listed above, and demonstrate that these elements were successfully executed and that the design intent has been achieved. |
| | Ozone Protection | | | Describe base building HVAC&R and fire suppression equipment and verify that it does not contain HCFCs and halon. |
| | Measurement and Verification | | | Describe any continuous monitoring equipment installed. This may include: lighting systems and controls; constant and variable motor loads; variable frequency drive operation; chiller efficiency at variable loads: cooling load; air and water economizer and heat recovery cycles; air distribution static pressures and ventilation air volumes; boiler efficiencies; building-related process energy systems and equipment; indoor water risers and outdoor irrigation systems. |
| Materials and Resources | Recycled Content | Percentage of building materials (by cost) that contain post-consumer or post-industrial recycled content. | | At a minimum, products meeting the recycled content requirements of EPA's Comprehensive Procurement Guidelines (http://www.epa.gov/cpg/) will be purchased. The purchase of these products will be reported to RRES-PP quarterly. Contact them for a form and instructions. Additionally, a table, included as an appendix, will be completed. The table will list all products purchased for the building and those with recycled content to determine the percent recycled content. The LEED™ reference template may be used. |

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|--------------------------------|-----------------------------|--|---|--|
| Materials and Resources | Local/Regional Materials | Percentage of building materials manufactured regionally within a 500 mile radius | | Materials that are manufactured within 500 miles of the project site. The table, included as an Appendix, will list all products purchased for the building and those manufactured within a 500 mile radius of the project site to determine the % of locally manufactured building materials. The LEED™ reference template may be used. |
| | Locally Harvested Materials | Percentage of materials (by cost) that are locally harvested and extracted within a 500 mile radius. | | Materials that are locally extracted, harvested or recovered (within 500 miles of the project site). Examples might include wallboard from the Albuquerque American Gypsum plant. The table, included as an appendix, will list all products purchased for the building and those harvested and extracted within a 500 mile radius of the project site to determine the percent of locally harvested building materials. The LEED™ reference template may be used. |
| | Rapidly Renewable Materials | Percentage of building materials (by cost) that are rapidly renewable | | Rapidly renewable materials can be planted and harvested in less than a 10 year cycle. Examples include bamboo flooring, cotton batt insulation, poplar OSB (oriented strand board) and linoleum (i.e., marmoleum) flooring. The table, included as an appendix, will list all products purchased for the building and those that are rapidly renewable to determine the % of rapidly renewable building materials. The LEED™ reference template may be used. |
| | Resource Reuse | Percentage of building materials (by cost) that are salvaged, refurbished or reused | | Salvaged or refurbished materials include structural elements (beams and posts), wood flooring and paneling, brick and masonry products, cabinetry and furniture and decorative items such as mantels, ironwork and light fixtures. The table, included as an appendix, will list all products purchased for the building and the equivalent cost of salvaged, refurbished or reused materials to determine the percent reused building materials. The LEED™ reference template may be used. |

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|------------------------------|---|--|---|---|
| | Construction Waste Management | The Contractor must also complete a construction waste management plan with recommended strategies to divert materials from the landfill during construction, and provide an estimate of the percentage of these diverted materials. | | A sample CWM plan may be available from PMD or the Engineering Standards Manager and can be used as a boilerplate. The CWM includes on-site recycling programs that can be used by the contractor to meet this requirement. The waste reduction and recycling goal for the project shall be stated here. The completed CWM plan and the results of waste diversion for the completed project will be included in the Appendix. |
| Indoor Environmental Quality | Construction IAQ Management Plan, During construction | Prevent IAQ problems from the construction process to help sustain comfort and well-being of construction workers. | | Develop and implement an Indoor Air Quality Management Plan for construction and pre-occupancy as follows: <ul style="list-style-type: none"> • Meet or exceed Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, Chapter 3. • Protect stored on-site or installed absorptive materials from moisture damage. • If air handlers are used during construction, filtration media must have a MERV of 8 at each return grill, per ASHRAE 52.2 |
| | Construction IAQ Management Plan, Before Occupancy | Prevent IAQ problems from the construction process to help sustain the comfort and well-being of the building occupants. | | Develop and implement an Indoor Air Quality Management Plan for pre-occupancy. The plan should be based on either: <ul style="list-style-type: none"> • A minimum two-week flush out with new MERV 13 filtration media or 100% outside air, OR • A baseline IAQ testing procedure consistent with the U.S. EPA's current Protocol for Environmental Requirements, Baseline IAQ and Materials for the Research Triangle Park Campus, Section 01445. The plan shall be submitted prior to construction and included as an appendix in this report |

| | SD Category | Description of requirement | Responsible discipline/ Actions required/ Status | Features included in Design |
|------------------------------|------------------------|--|---|---|
| Indoor Environmental Quality | Low Emitting Materials | Reduce the quantity of indoor air contaminants that are harmful to the well-being of the occupants. | | <p>Low-emitting materials per the architectural requirements. These should include:</p> <ul style="list-style-type: none"> • Adhesives and Sealants with a volatile organic content (VOC) less than the limits of the South Coast Air Quality Management District Rule #1168. • Sealants used as filler that meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51. • Paints and coatings with VOC emissions less than the Green Seal Standard GS-11. • Carpet Systems that meet or exceed the requirements of the Carpet and Rug Institute's Green Label Indoor Air Quality Test Program. <p>Include reference to construction specifications requiring these materials and cut-sheets in the appendix for documentation.</p> |
| | Other Design Features | The Contractor will describe other design features that promote a better indoor environmental quality. | | <p>Other features should be described in the indoor environmental quality category if they were included in the design. These are:</p> <ul style="list-style-type: none"> • Minimum IAQ performance, consistent with ASHRAE 62-1999 and the mechanical requirements • Carbon Dioxide Monitoring • Ventilation Effectiveness per ASHRAE 129-1997 • Indoor Chemical and Pollutant Control • Controllability of Systems, per the mechanical requirements • Thermal Comfort <ul style="list-style-type: none"> – Compliance with ASHRAE 55, per the mechanical requirements – Permanent Monitoring System • Daylight and views <ul style="list-style-type: none"> – Describe how day lighting was incorporated into the building per the requirements of the architectural requirements – Describe features to maximize views to the outside |

ATTACHMENT 3 EE/SD REPORT – LINE ITEM PROJECTS ONLY

A detailed Sustainable Design Report is required for non-process Line Item buildings (offices, labs). The Sustainable Design report shall be initiated during the programming phase, and viewed as a decision making tool, so that it will be a value added function of the design process. This report represents the results of the sustainable design efforts for the facility. This report shall contain an analysis of sustainable design issues, organized according to the LEED rating categories. In cases where similar information is required in other project deliverables, this report will provide a summary of the results with cross-references to the parent document. At a minimum the Sustainable Design Report will contain the following elements.

1. Sustainable Sites. This analysis augments the Site Analysis described and will address site development issues that will decrease the environmental impact of the project. A separate sites analysis and program document will be developed. This analysis integrates sustainable issues with broader security and mission-related concerns. The Sites Analysis report will be referenced as the parent document. A summary of the recommendations from the Sites Analysis report will be provided for the following items.
 - Erosion and Sedimentation Control
 - Alternative Transportation options
 - Reduced Site Disturbance
 - Stormwater Management
 - Reduction of Heat Islands and Light Pollution
2. Water Efficiency. This section shall contain a brief narrative of the overall approach to reduce water use, with specific details as indicated below.
 - Brief narrative description on alternatives considered and description of selected systems, with results of life-cycle analyses
 - Estimate of water use per capita for the building, with a description and quantification of water use reduction resulting from the incorporation of water conserving features, such as native plant landscaping, rainwater harvesting, water efficient plumbing fixtures and cooling tower efficiency (if applicable).
3. Energy and Atmosphere. This section consists minimum requirements for the Energy Conservation report (10 CFR435 compliance, based on guidance in the Federal Users Manual), and additional details required as indicated below.
 - Brief narrative description on alternatives considered and description of selected systems, with results of life-cycle analyses
 - Schedules of expected occupancy hours and equipment operation
 - Foldout on selected HVAC zones
 - Cutsheets on major energy using equipment (including energy efficient features)
 - Results of energy analysis, including possible energy use index (BTU/GSF/yr) of selected design
 - Recommendations and Summary
 - Cross Reference with Commissioning Plan, that includes the design basis and design analysis

- Estimate of air pollution emissions avoided from the incorporation of energy-efficient measures (both on-site and off-site sources of pollution will be included).
 - Summary and recommendations.
4. **Materials and Resources.** The construction contractor has the option of substituting “equivalent” building materials as allowed by the Contract; however, the A/E shall identify and specify environmentally preferable products in the design of the building (refer to the Environmental Protection Agency [EPA] Comprehensive Procurement Guidelines at <http://www.epa.gov/cpg>). The A/E shall also recommend strategies to avoid disposing of materials in a landfill during construction and shall provide an estimate of the percentage of materials diverted. This information will be used by the construction contractor to develop a construction waste management plan.

The Sustainable Design Report shall contain matrices identifying environmentally preferable products, material diversions, and salvaged materials. The matrix shall be in a table format, with column headings reflecting the “as-designed” and “as-constructed” percentages. The A/E shall complete the “as-designed” column, while the construction contractor shall complete the “as-constructed” column. The LEED Reference Guide provides examples of matrices.

The Sustainable Design Report shall contain matrices according to the categories listed below.

- Percentage of building materials (by cost) that contain in aggregate a minimum of 20% post-consumer recycled content material or a minimum of 40% post-industrial recycled content material.
 - Percentage of building materials (by cost) that are manufactured regionally within a 500 mile radius.
 - Percentage of rapidly renewable (by cost) materials (those planted and harvested in less than 10 years).
 - Percentage of materials (by cost) manufactured regionally (within a 500 mile radius).
 - Percentage of wood-based material (by cost) certified in accordance with the Forest Stewardship Council.
 - Other materials (by cost) considered “green” based on durability, low-embodied energy, or environmental life-cycle costs.
 - Percentage of construction, demolition and land clearing debris diverted from the landfill.
 - Percentage of refurbished or salvaged materials used in the building.
5. **Indoor Environmental Quality.** This section shall contain a brief narrative of alternatives considered and a description of selected design features, addressing Indoor Air Quality (IAQ), sound quality, thermal comfort and the visual environment, and additional details as indicated below.
- Brief narrative description on alternatives considered and description of selected systems, with results of life-cycle analyses
 - Identification of an IAQ monitoring to sustain long-term occupant health and comfort.